MQL Drilling Performance Test

Objective

The objective of the test is to investigate the performance of MQL compared to dry and through-tool coolant applications.

Test Details

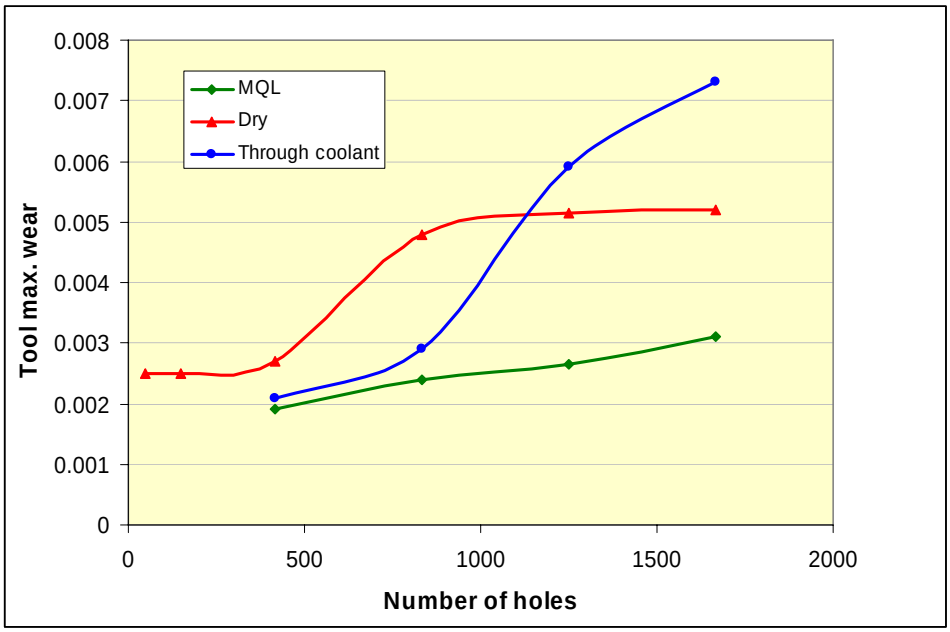
Parameter	Detail
Drill	Kennametal HP drill
Diameter	8.5 mm
Speed	430 sfm
Feed	0.010 ipr
Hole depth	30 mm
Work Material	AISI 4140 Steel
Holder	Hydraulic Chuck
Machine	Mazak AJ125/40

Test Results

The following applications were tested:

(1) MQL through tool (5% sulphur additive)
(2) Dry (no air either)
(3) Flood coolant through tool (5% concentration)

Tool wear progression over approximately 1600 holes was recorded, and is plotted below. Please note that this is well within the wear criteria of 0.010 inches, and hence does not indicate tool life (number of holes when the drill exceeds wear criteria).

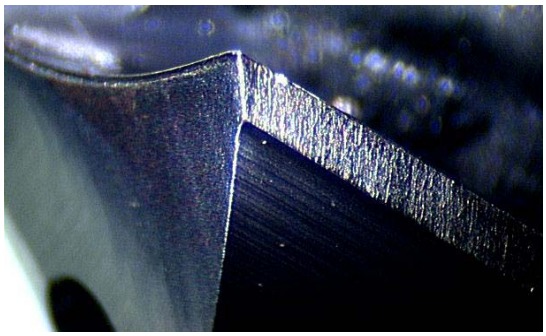


Tool wear versus number of holes under different applications

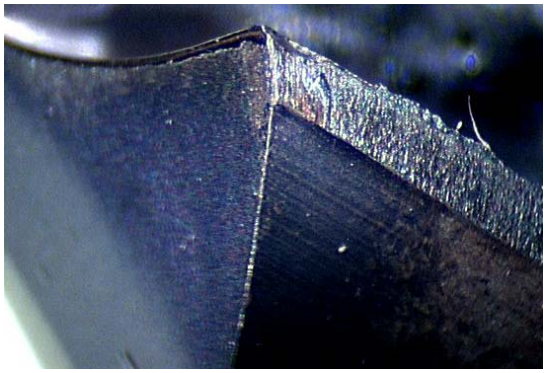
Observations

1) Drill used with MQL showed least amount of tool wear within the number of holes drilled.
2) Dry application showed larger wear to start with but then settled to steady value.
3) Drill with through tool flood coolant started with less wear, but it gradually increased to show more wear compared to the dry drill after 1668 holes.

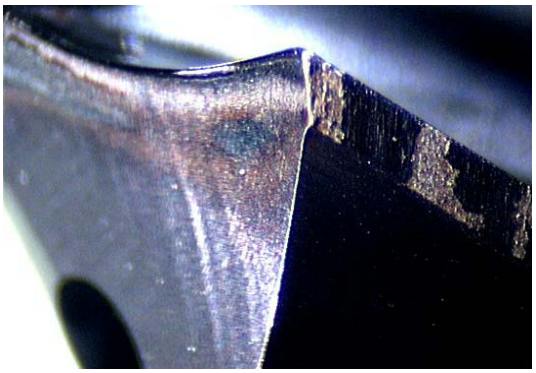
Tool wear pictures



(a) MQL through tool



(b) Dry



(c) Though tool flood coolant

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